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A Latent Profile Analysis of the Psychopathic Personality Inventory in a Representative Sample of Referred Boys

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Abstract

A long tradition of theoretical and empirical work has described different variants (or subtypes) of psychopathy, in an attempt to delineate similarities and differences among constellations of psychopathic traits. Research in this area has the potential to increase our understanding of the etiology of different psychopathy variants, their associated risk and protective factors, as well as to inform the development of tailored interventions. Drawing on data from a large, representative sample of referred boys incarcerated in the United States ($N = 629$; $M_{age} = 15.49$ years, $SD = 1.23$), the current study adopted a person-centered approach to identify variants of incarcerated youth based on scores on the eight Psychopathic Personality Inventory-Short Form (PPI-SF) subscales. Latent Profile Analysis (LPA) results identified five variants of youth: a high psychopathy variant, a variant with moderate psychopathy scores, and three variants with distinct elevations on some PPI-SF scales. Over one-third of participants had substantially high levels of psychopathic traits, and high levels of psychopathy were associated with a severe history of delinquency. LPA findings also supported traditional and contemporary perspectives on psychopathy variants according to which different constellations of psychopathic traits are associated with different degrees of delinquent behavior, internalizing symptoms, substance use, and victimization. Finally, it appears that individually, none of the trait domains assessed by the PPI-SF can explain differences across variants, and that it is the co-occurrence of all of the features that characterizes the most severe form of psychopathy.

Keywords: psychopathic traits, subtypes, juvenile offenders, primary psychopathy, secondary psychopathy

Psychopathic personality is characterized by a constellation of affective (e.g., callousness, lack of empathy), interpersonal (e.g., detachment, manipulation), and behavioral (e.g., disinhibition, irresponsibility) traits (Hare & Neumann, 2008; Patrick, Fowles, & Krueger, 2009).

Psychopathic individuals also show impaired threat detection and lack normal experience of anxiety – deficits often ascribed to dispositional fearlessness (Neumann, Johansson, & Hare, 2013; Patrick et al., 2009). The study of psychopathy has long been of interest to juvenile criminal justice and mental health systems (Frick & Marsee, 2018; Salekin, Andershed, & Clark, 2018). Because treatments are more effective in youth than in adults (Ribeiro da Silva, Salekin, & Rijo, 2019; Salekin, Worley, & Grimes, 2010), research on psychopathy in youth is vital to deepen our understanding of this disorder at this developmental stage (Frick & Marsee, 2018). The present study aimed at: (1) identifying psychopathy variants¹ in a representative sample of referred youth from the United States; and (2) validating emerging psychopathy variants based on levels of criminal and clinical correlates across internalizing and externalizing domains.

Psychopathy Variants: Conceptual and Empirical Background

The multidimensional nature of the psychopathy construct implies that psychopathy can be parsed in lower-order dimensions for assessment purposes. Also, it implies that individuals can have comparably high levels of psychopathy due to different combinations of traits (Hicks & Drislane, 2018; Mokros et al., 2015; Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). This has great relevance in clinical and forensic settings, as it allows differentiating individuals with varying degrees of psychopathy not only based on the severity of their personality pathology, but also based on the specific constellation of traits they manifest. In turn, this differentiation can

¹ In keeping with recent recommendations (e.g., Hicks & Drislane, 2018), we consistently use the term *variants* instead of *subtypes* because our aim was to identify prototypes of individuals that occupy distinct positions in a multidimensional space defined by scores on clustering variables (i.e., dimensional scores of psychopathic traits), rather than assuming the existence of discrete categories (i.e., *subtypes*) of youth.

help identify subgroups of offenders that present different etiologies and psychological profiles, and respond to different kinds of interventions (Skeem, Polaschek, Patrick, & Lilienfeld, 2011).

Work on psychopathy variants in adults often described – although using different labels – a *primary* and a *secondary* variant of psychopathy (e.g., Karpman, 1941; Lykken, 1995). Key distinctions between these two variants concerned levels of anxiety and fear (and by extension, internalizing symptoms), as well as environmental etiological precursors such as traumatic experiences, all being higher in the secondary variant (Lykken, 1995). However, some authors (e.g., Hicks & Drislane, 2018; Mokros et al., 2015) have suggested that using the label *secondary psychopathy* may be misleading because in some studies it is used to describe a non-psychopathic group of antisocial offenders. Notably, despite some differences, subtyping studies in adult populations have generally provided evidence for the existence of these two variants (Hicks & Drislane, 2018). Yet, given that the focus of the present study is on youth, we review here in more details studies based on youth.

Psychopathy Variants in Youth

Similar to adult variants, clinical insights suggested the existence of distinct variants of psychopathic youth characterized by low and high levels of anxiety, accompanied by more covert and overt antisocial tendencies, respectively (Frick & Marsee, 2018). From this perspective, the high-anxiety variant would stem from negative environmental experiences such as trauma, unlike the low-anxiety variant. Investigations of psychopathy variants in youth are less common than in adults and characterized by variations in methodological approaches (e.g., sample and clustering variable selection), making comparisons across studies challenging. Here, we focus on studies that have examined variants of youth based on the whole range of scores on psychopathic traits, rather than pre-selecting participants with elevated levels of psychopathy. A

seminal study that used cluster analyses on three subscales from the Antisocial Process Screening Device (APSD; Frick & Hare, 2001) identified five variants. One low on psychopathic traits across subscales, one high on all three subscales, and three additional variants with specific elevation on affective (i.e., APSD callous-unemotional), interpersonal (i.e., APSD narcissism), and behavioral (i.e., APSD impulsivity) traits of psychopathy (Frick & Hare, 2001).

More recently, several studies investigated variants using the whole distribution of scores on psychopathy measures (Colins, Fanti, Salekin, Mulder, & Andershed, 2018; Gill & Stickle, 2016; Lee, Salekin, & Iselin, 2010; Ribeiro da Silva et al., 2019; Wareham, Dembo, Poythress, Childs, & Schmeidler, 2009) and did not find support for the presence of high and low anxiety variants. Lee et al. (2010) used model-based cluster analysis with 94 male offenders utilizing clinician-rated and self-reported measures of psychopathic traits across three domains (affective, interpersonal, and behavioral) and anxiety as clustering variables. Three variants emerged that had low, moderate, and high levels of psychopathic traits across components, but also low, moderate, and high levels of anxiety, respectively. These variants did not differ in offending-related variables, but the high psychopathy variant showed the highest levels of neuroticism and risk-taking. The same pattern emerged in community and forensic samples using latent profile analysis (LPA) conducted with the three subscales (affective, interpersonal, behavioral) of the Youth Psychopathic traits Inventory (YPI; Andershed, Kerr, Stattin, & Levander, 2002). Three groups with low, moderate, and high levels of psychopathy emerged and had linear associations with aggression, substance use, and psychological symptoms (Ribeiro da Silva et al., 2019).

Other studies in juvenile offenders also included the three YPI subscales and additional indices of internalizing and externalizing symptoms as clustering variables. The overall patterns provided evidence for a non-psychopathic variant next to variants with moderate to high

psychopathy, but with varying levels of internalizing symptoms across studies (Gill & Stickle, 2016; Wareham et al., 2009). In one study, the high psychopathy/low anxiety group consisted predominantly of male participants, whereas the moderate psychopathy/high anxiety variant consisted predominantly of female participants and also had higher levels of empathy, suggesting that gender differences may have unduly influenced the results (Gill & Stickle, 2016). Another recent LPA of the YPI subscales and an anxiety measure in a sample of detained boys, failed to corroborate the high and low anxiety variants of psychopathy (Colins et al., 2018).

To our knowledge, only one study – focused on young adults – used the eight subscales of the Psychopathic Personality Inventory-Short Form (PPI-SF; Lilienfeld & Hess, 2001) as in the present study. Specifically, Lee and Salekin (2010) found two variants in an undergraduate sample pre-selected for high levels of psychopathy. One variant had higher scores on the interpersonal and affective traits of psychopathy, and lower anxiety (viz., Stress Immunity), whereas the other variant had higher levels of the behavioral features of psychopathy and higher anxiety. Although these variants were consistent with theoretical expectations, it should be noted that the first variant was unexpectedly characterized by higher levels of trait guilt.

The Present Study²

Overall, while a high (prototypical) psychopathy variant is consistently found in adults and youth, studies differed in levels of anxiety and internalizing that characterized this variant. In addition, compared to studies in adults, studies in youth seem to provide a less consistent picture regarding the presence of additional psychopathy variants with comparably overall levels but different constellations of traits. None of the studies reviewed above provided convincing support for two psychopathy variants in youth that resemble the conceptual distinction between

² The study protocol, data analytic plan, and hypotheses were registered prior to conducting the analysis and can be retrieved at this link: https://osf.io/r4yzx/?view_only=ab2c6c2d8d9c42508ca514e759290f46

adult variants and akin to what some studies have termed *primary* and *secondary* psychopathy.

In an attempt to advance knowledge in this area, the present investigation leveraged data from a representative, statewide sample of incarcerated male adolescents, to uncover psychopathy variants based on the PPI-SF subscales. The PPI is especially suitable for this purpose, as it was developed with the aim of being over-inclusive of trait descriptors of psychopathy from different scholarly and theoretical traditions. Thus, the PPI subscales maximize the content coverage of historical and contemporary descriptions of psychopathy (Sellbom, Lilienfeld, Fowler, & McCray, 2018), and includes two subscales that assess constructs traditionally relevant for subtyping studies, that is, low anxiety (i.e., Stress Immunity) and Fearlessness. Next, we validated emerging variants based on scores on another psychopathy measure (i.e., the APSD) as well as on a host of clinically relevant constructs across the internalizing and externalizing domains. Given mixed findings from previous studies, we hypothesized to uncover at least four variants: (1) a prototypical psychopathy variant with high scores on all PPI-SF subscales; (2) a psychopathy variant characterized by higher scores on overt aggressive and impulsive tendencies; (3) a psychopathy variant characterized by manipulation, fearlessness, and low anxiety;³ and (4) a non-psychopathic variant. We expected the second variant to show higher levels of externalizing and internalizing symptoms compared to the third variant. Finally, despite contrasting findings (e.g., Lee et al., 2010), we expected the prototypical psychopathy variant to have the highest levels of externalizing symptoms, but moderate levels of internalizing symptoms. This hypothesis was based on the rationale that the full constellation of psychopathic traits would include traits like fearlessness and low anxiety that are considered protective against internalizing symptoms (Cleckley, 1941; Patrick et al., 2009).

³ The 2nd and 3rd variants in our hypotheses resemble what some previous studies have termed *secondary* and *primary* psychopathy, respectively. Yet, we refrained from using this terminology for the sake of conceptual clarity.

Method

Procedures

The present investigation was based on secondary data analyses of a large-scale dataset collected from current residents in the Missouri Division of Youth Services (DYS) between 2002 and 2003, representative of the population of incarcerated youth in the United States in terms of demographic and crime data. Formal written consent was obtained from the Deputy Director for Treatment Services at the DHS before asking potential participants' assent. Youth were then invited to participate and informed that their decision about participating would not affect their legal situation. Participation in the study was voluntary and was compensated with \$10. Data were collected by means of a face-to-face structured interview conducted by trained interviewers and supervised by on-site supervisors. The study protocol received formal ethical approval by DHS, the Washington University Human Studies Committee Institutional Review Board, and the federal Office of Human Research Protection. The National Institute on Drug Abuse granted a Certificate of Confidentiality. A detailed description of the study from which these data were drawn was provided elsewhere (e.g., Vaughn, Howard, Foster, Dayton, & Zelner, 2005).

Participants

The research team invited all current residents to partake in the study ($N = 740$). Of these, 728 were available and began the interview, and 723 completed it, translating into a 97.7% response rate. Because the number of girls was considered too small ($N = 94$; 13%) to examine latent profiles separately across gender, the present investigation involved only boys. Of the 629 male participants in the overall sample, 13 (2%) were removed from the dataset due to missing data or random responses based on two validity items. The sample used consisted of 616 boys

(i.e., 85% of the whole sample) with a mean age of 15.51 ($SD = 1.26$; range = 11–20)⁴. They self-identified with the following ethnic backgrounds: African-American, $n = 213$ (34.6%); White, $n = 331$ (53.7%); Latino, $n = 24$ (3.9%); and Multi-ethnic/other, $n = 48$ (7.8%). One participant (0.2%) had completed fifth grade; 18 (2.9%) had completed sixth grade; 43 (7%) seventh grade; 79 (12.8%) eighth grade; 200 (32.5%) ninth grade; 181 (29.4%) tenth grade; 62 (10.1%) eleventh grade; and 31 (5%) twelfth grade. One participant did not report on his educational level. Before going into DYS custody, 236 (38.3%) participants were living in an urban city area; 86 (14%) in a suburban area near a city; 248 (40.3%) in a small town; and 46 (7.5%) in a rural or country area. On average, they had been in DYS custody for 7.58 months ($SD = 8.45$; range = 0–60) and still had 4.99 months ($SD = 6.92$; range = 0–48) until release. Five-hundred-fifteen participants (83.6%) had already been in another detention center immediately before going into DYS custody, with an average of 7.22 months spent in the previous facility ($SD = 8.27$; range = 0–60).

Measures

Psychopathic Personality Inventory-Short Form (PPI-SF; Lilienfeld & Hess, 2001).

Clustering variables were represented by the eight subscales of the PPI-SF, the short version of the PPI-Revised (Lilienfeld & Widows, 2005). The PPI-SF consists of 56 items rated on a 4-point Likert scale ranging from 1 = *false* to 4 = *true*, with each subscale consisting of seven items. *Fearlessness* ($\alpha = .67$) measures an eagerness for risk-seeking behaviors in the absence of the experience of fear. *Stress Immunity* ($\alpha = .61$) assesses a lack of marked reactions that would be typical in stress-inducing circumstances. *Social Potency* ($\alpha = .59$) measures the perceived ability to charm and influence others. *Coldheartedness* ($\alpha = .70$) measures a lack of guilt and

⁴ Analyses were repeated controlling for age and results were unchanged.

remorse, and a callous disregard for others' feelings. *Carefree Nonplanfulness* ($\alpha = .63$) assesses difficulties in considering the consequences of one's actions and in making long-term plans. *Blame Externalization* ($\alpha = .72$) measures a tendency to blame others for or rationalize one's misbehavior. *Impulsive Nonconformity* ($\alpha = .54$) assesses a tendency for immediate gratification and a disregard for social norms. Finally, the *Machiavellian Egocentricity* ($\alpha = .68$) subscale assesses a lack of empathy, the tendency to put one's own desires ahead of others', and a sense of detachment from others. In the present study, inter-correlations among PPI-SF scales ranged from $|.018|$ (between Social Potency and Fearlessness) to $|.459|$ (between Social Potency and Stress Immunity), with an average absolute value of $r = .219|$ and a median absolute value of $r = .227|$. This pattern of correlations does not seem to raise concerns of multicollinearity that could unduly influence LPA results.

Antisocial Process Screening Device (APSD; Frick & Hare, 2001). The APSD is a self-report instrument designed to measure psychopathic traits in children and adolescents. It consists of 20 items rated on 3-point Likert scale ranging from 0 = *Not at all true* to 2 = *Definitely true*. Eighteen of the APSD items load onto three subscales: Narcissism ($\alpha = .70$), which captures grandiosity and interpersonal exploitation; Callous-Unemotional ($\alpha = .46$), which captures a lack of empathy for others and shallow expression of emotions; and Impulsivity ($\alpha = .60$), which captures low self-control and disinhibition. In addition, two items ("*You engage in illegal activities*", "*You lie easily and skillfully*") do not load on any factor but contribute to the total score ($\alpha = .77$). Despite the often reported low internal consistency coefficients for some subscales, the APSD has shown evidence of adequate construct validity (Mũnoz & Frick, 2007).

Self-Report of Delinquency (SRD; Elliott, Huizinga, & Ageton, 1985). The SRD was used to assess participants' antisocial behaviors occurred over the year before going into custody.

The current version was modeled after a similar measure used in the National Youth Survey (Elliott et al., 1985), consisting of 17 items asking about 17 types of illegal behaviors based on offenses reported in the Uniform Crime Report with a juvenile base rate of 1% or higher. Participants reported the frequency of committing each act rating the SRD items on a 9-point Likert scale ranging from 0 = *Never* to 8 = *2-3 times per day*. We used a composite score by averaging all SRD items ($\alpha = .84$), as well as two separate scores for violent (9 items; $\alpha = .73$) and non-violent behaviors (8 items; $\alpha = .80$).

Criminal history. History of criminal behavior was measured using the following three questions: *How old were you when you first violated any of the above rules or laws?* (age of onset); *How old were you when you had your first contact with the police?* (first police contact); and *At what age were you first referred to juvenile court?* (first juvenile court appearance).

Substance use. Past year use and number of lifetime substance use occasions were measured using a substance use index developed by Vaughn et al. (2009). This scale was created by summing various types of substances used including alcohol, heroin, ecstasy, marijuana, hallucinogens, cocaine, and amphetamines. The average self-reported frequency of past year substance use was 27.06 ($SD = 19.01$; range = 0–102; $\alpha = .88$), whereas for lifetime substance use it was 15.44 ($SD = 10.34$; range = 0–51; $\alpha = .75$).⁵

Massachusetts Youth Screening Inventory-2 (MAYSI-2; Grisso & Barnum, 2000). The MAYSI-2 Traumatic Experiences subscale was used to assess prior experiences of trauma through 5 dichotomous (*yes/no*) items. Affirmative responses to each item were summed to provide an overall index of traumatic experiences ($\alpha = .67$). In addition, 5 items of the Suicidal

⁵ The lower frequency of lifetime use compared to past year use may appear counterintuitive but can be explained by the fact that participants were instructed to report the number of single consumptions (e.g., reporting 10 if they inhaled solvents 10 times during the same occurrence) for past year use, but to report only the number of occurrences (e.g., reporting 1 in the same example) for lifetime use.

Ideation subscale of the MAYSI-2 were used to compute a suicidality index. Suicidal ideation was assessed using five *yes/no* questions assessing whether, at any time in his life, the youth had (1) *ever wished to be dead*; (2) *felt that life was not worth living*; (3) *wanted to hurt himself or herself*; (4) *felt like killing himself or herself*; and (5) *given up hope on life*. In addition, participants had to indicate whether they had ever attempted suicide (*yes/no*). Affirmative responses for both suicidal ideation and attempts items were summed to create a single score with a range from 0 to 6 ($\alpha = .90$; separate analyses for suicidal ideation and attempts yielded identical results).

Victimization. Level of prior personal victimization experienced in the 12 months before incarceration (e.g., “*Been attacked by someone trying to seriously hurt or kill you*”) was assessed using a four-item victimization index ($\alpha = .77$) developed by Esbensen et al. (2001). These items were rated on a 9-point Likert scale ranging from 0 = *Never* to 8 = *2-3 times per day*.

Brief Symptom Inventory (BSI; Derogatis, 1993). The BSI is a 53-item self-report inventory that enquires about current (i.e., in the past 7 days) psychological distress in nine symptom domains: anxiety ($\alpha = .79$), phobic anxiety ($\alpha = .71$), depression ($\alpha = .81$), interpersonal sensitivity ($\alpha = .72$), obsessive-compulsive symptoms ($\alpha = .80$), paranoid ideation ($\alpha = .73$), somatization ($\alpha = .76$), hostility ($\alpha = .79$), and psychoticism ($\alpha = .66$). The BSI produces an overall index of general psychological distress (i.e., Global Severity Index, GSI; $\alpha = .96$). Each item is rated on a 5-point Likert scale ranging from 0 = *Not at all* to 4 = *Extremely*.

Data Analysis

After descriptive statistics and internal consistency coefficients for all study variables were computed, Latent Profile Analysis (LPA) was conducted in Latent Gold 5.0 (Vermunt & Magidson, 2016) to identify the optimal number of profiles using the eight PPI-SF subscales as

continuous indicators. LPA is a person-centered approach used to identifying latent subgroups based on their similarity on scores of a set of continuous observed variables through maximum likelihood estimation. As per standard recommendations (e.g., Nylund, Asparoutiov, & Muthen, 2007), the following criteria were considered to identify the best solution: classification error (average probabilities for the most likely class membership $> .80$); Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted BIC (SSABIC; models with lower AIC/BIC/SSABIC values are preferred); Lo-Mendel-Rubin (LMR) likelihood difference test and Bootstrapped Likelihood Ratio Test (BLRT; for both LMR and BLRT, a significant p -value indicates that a model fits the data significantly better than a model with one less class); theoretical coherence and interpretability (e.g., avoiding solutions wherein one or more classes have a trivial number of participants, e.g., $< 5\%$ of the total sample). Next, a 3-step procedure was used to examine differences on external correlates across profiles while accounting for measurement error by means of Wald tests for paired comparisons.

Results

Descriptive statistics for the whole sample are reported in the Supplementary Materials (SM; Table S1). Table 1 shows model fit statistics for 1- to 9-class solutions. The AIC, SSABIC, and BLRT did not provide clear indications for the best solution as they kept favoring any subsequent solution until a 9-class solution, which included two classes with less than 5% of participants (i.e., with decreasing AIC and SSABIC values and significant BLRT p -values). The BIC values stopped decreasing after reaching a 6-class solution. However, the difference between the 5- and 6-class solution was less than two units, thus being indicative of weak evidence in favor of the 6-class model (Raftery, 1995). Finally, a non-significant LMR p -value indicated that the 4-class solution did not significantly improve over the 3-class solution.

However, the decrease in BIC value from the 3- to the 4-class solution was of over 40 units, representing strong evidence that the 4-class model was an improvement over the 3-class model (i.e., with odds over 150:1 in favor of the strongest model with lower BIC; Raftery, 1995). Next, the LMR p -value was significant for the comparison between the 4- and 5-class solutions, indicating that the 5-class solution was significantly better than the 4-class solution in modeling the data. Further, a non-significant LMR p -value for the comparison between the 5- and 6-class solutions indicated that the 6-class solution did not significantly improve over the 5-class model, and the subsequent LMR p values were also not significant. The five classes from the 5-class solution were also reproduced in the 6-class solution, and all classes included at least 5% of participants. Further analyses showed that the additional class that emerged in the 6-class solution did not have a unique profile in terms of external correlates. Hence, in the interest of parsimony and to avoid unnecessary complexity in follow-up analyses, the 5-class solution was retained for further analyses and is described in more detail hereafter. More details on the 6-class solution, as well as on the 4-class solution for the sake of comparison, are reported in the SM.

A graphical depiction of the 5-class solution is reported in Figure 1. Table 1 shows mean scores of the eight PPI-SF subscales across the five clusters and pairwise comparisons. For each PPI-SF subscale, there was a multivariate statistically significant difference across the five clusters, Wald statistics ≥ 83.84 , $ps < .001$. Cluster 1 had moderate levels across all PPI-SF subscales, without clear elevations on any scale, and included the majority of participants (roughly 45%). It was therefore labeled *Moderate Psychopathy* and considered as comparison group for the other clusters. Cluster 2 included approximately 20% of participants, hence representing the second largest cluster. This cluster showed (both within cluster, and in comparison to other clusters) elevations on the Fearlessness, Machiavellian Egocentricity, and

Blame Externalization subscales. Thus, it was labeled *Fearless, Egocentric, and Hostile*. This cluster also had the lowest levels of Stress Immunity, Social Potency, and Coldheartedness.

Cluster 3 (roughly 17% of the total sample) had elevations on the Stress Immunity and Social Potency subscales, and generally low levels on all other subscales, especially Carefree Nonplanfulness. Hence, it was labeled *Low Anxious and Dominant*. Cluster 4 (roughly 10% of the total sample) also had elevations on the Stress Immunity and Social Potency subscales, but also had the highest level of Coldheartedness within and between clusters. Thus, we labeled it *Low Anxious, Dominant, and Callous*. Notably, this cluster also had relatively higher scores on the Carefree Nonplanfulness scale, and low scores on Impulsive Nonconformity. Finally, Cluster 5 was defined by relatively higher scores on all subscales when compared to the other clusters, and generally consistent scores across subscales within cluster. Thus, it was labeled *Psychopathic*, as it likely represents a configuration of the prototypical psychopath based on the PPI-SF method of operationalization. This cluster included roughly 8% of the participants.

Profile Validation: Group Comparisons with Three-Step Approach

Group comparisons are displayed in Tables 2 and 3. First, we inspected differences in age and levels of psychopathic traits, assessed with both PPI-SF total score, and the APSD scale and total scores. As shown in Table 2, there were small but significant differences in age, such that participants in the *Low Anxious, Dominant, and Callous* cluster were the youngest on average, and participants in the *Low Anxious and Dominant* cluster were the oldest on average. In line with the *Psychopathic* label, participants in Cluster 5 had the highest psychopathy scores on the PPI-SF as well as on the APSD total and scale scores, with the exception of APSD Narcissism. The *Moderate Psychopathy* and *Low Anxious and Dominant* clusters had the lowest levels of PPI-SF total scores, suggesting that they represent the low end of the continuum in psychopathy

scores. However, between these two clusters, the *Moderate Psychopathy* cluster had relatively higher APSD scores, in particular on the Impulsivity scale, likely representing a general antisocial variant as opposed to a non-psychopathic, non-antisocial variant like the *Low Anxious and Dominant* cluster. Finally, Cluster 2 and 4 had relatively higher levels of PPI-SF total scores, likely representing two variants of psychopathy. However, Cluster 2 (*Fearless, Egocentric, and Hostile*) had relatively higher scores on the APSD Narcissism and Impulsivity subscales, whereas Cluster 4 (*Low Anxious, Dominant, and Callous*) on APSD Callous-Unemotional.

Table 2 also shows pairwise comparisons on indices of externalizing (crime- and substance use-related correlates). The *Psychopathic* cluster had the highest levels of total, violent, and non-violent delinquent behaviors. In decreasing order, it was followed by the *Fearless, Egocentric, and Hostile* cluster, the *Moderate Psychopathy* cluster, the *Low Anxious, Dominant, and Callous* cluster, and the *Low Anxious and Dominant* cluster, respectively. In addition, participants in the *Psychopathic* cluster were the youngest on average at the time of first crime committed, whereas participants in the *Low Anxious and Dominant* cluster were the oldest, and participants in the *Moderate Psychopathy* cluster were in the middle. However, age of first police contact and age of first appearance in juvenile courts less clearly distinguished the different clusters, although participants in the *Low Anxious and Dominant* cluster were the oldest on average, and participants in the *Low Anxious, Dominant, and Callous* were generally the youngest. Regarding substance use, participants in the *Psychopathic* cluster reported by far the highest rates of past year and lifetime substance use. The other clusters followed in decreasing order in such a manner that mirrored the pattern of delinquent behaviors. Yet, the *Fearless, Egocentric, and Hostile* had clear significant elevations compared to the other three clusters.

Table 3 shows pairwise comparisons on internalizing indices, conceptually grouping

victimization, suicidality, traumatic experiences, and psychological distress (i.e., BSI symptoms). The pattern of group differences for victimization, suicidality, and traumatic experiences was similar to the externalizing symptoms. Overall, the *Psychopathic* and *Fearless, Egocentric, and Hostile* clusters had the highest rates of self-reported victimization, suicidality, and traumatic experiences, followed by the *Moderate Psychopathy* cluster. However, the *Low Anxious, Dominant, and Callous* cluster had the lowest rates on these indices, even when compared to the *Low Anxious and Dominant* cluster (albeit not all of these differences were significant). Of note, the *Psychopathic* cluster had the highest rates of victimization, but the *Fearless, Egocentric, and Hostile* was the cluster with the highest rates of suicidality and traumatic experiences (the latter being not significantly different between the two clusters). On the BSI, there was a remarkably similar pattern across all subscales and the total score. Specifically, participants in the *Fearless, Egocentric, and Hostile* reported the highest levels of psychological distress across all domains, followed by participants in the *Psychopathic* and *Moderate Psychopathy* clusters, respectively. The *Low Anxious and Dominant* and the *Low Anxious, Dominant, and Callous* clusters had the lowest scores on the BSI subscales and did not differ significantly from one another. In the interest of conceptual clarity, we present a summary of our findings in Table S8.

Discussion

The present study employed an LPA of the PPI-SF subscales to identify variants of juvenile offenders based on levels of psychopathic traits, in a statewide sample of referred boys representative of the youth population detained in the United States. Overall, our results highlighted the presence of a prototypical psychopathic variant, along with two variants of psychopathy characterized by different personality profiles, and two variants scoring lower on psychopathic traits (specifically, an antisocial variant and a relatively well-adjusted variant).

These five variants demonstrated distinct patterns of associations with external correlates that were conceptually meaningful. Thus, they may be indicative of different etiological, psychopathological, and criminal aspects associated with each profile, which in turn may be helpful to devise different treatment approaches. Here, we first briefly focus on the utility of each of the eight trait domains captured by the PPI-SF subscales in differentiating across variants. Then, we discuss the characteristics of the five variants that emerged.

Utility of the PPI-SF Subscales to Identify Variants of Referred Youth

A great deal of debate has concerned the role of boldness/fearless dominance traits within the construct of psychopathy (e.g., Lilienfeld et al., 2012; Lynam & Miller, 2012), represented in the PPI-SF by the Fearlessness, Stress Immunity, and Social Potency subscales. These traits are heavily influenced by Cleckley's (1941) description of a *mask of sanity* that would conceal the psychopathology of psychopathic individuals. Most scholars agree that these traits are neither necessary nor sufficient for psychopathy, but rather may represent a *specifier* that distinguishes different variants of psychopathic individuals (Sleep, Weiss, Lynam, & Miller, 2019). Notably, the Fearlessness scale seemed especially important in differentiating variants of youth in the current sample, demarking differences between psychopathic and non-psychopathic variants, as well as differences among psychopathic variants. The Social Potency and Stress Immunity subscales followed a different pattern compared to Fearlessness. Although they were higher in the prototypical psychopathy variant, they were also higher in one of the other two psychopathic variants and in one of the two variants with the lowest psychopathy scores. These results suggest that traits entailing low trait anxiety, resilience to stress, and interpersonal dominance may be present in all youth, regardless of psychopathological problems. Thus, these traits may be capturing the *mask of sanity* described by Cleckley (1941), and may be associated with more

adaptive or maladaptive correlates depending on whether they co-occur with pathological traits. This pattern had previously received little support when examining the interactive effects between psychopathy subscales (Sleep et al., 2019), but if replicated, the present results suggest that it may be captured more adequately adopting a person-centered approach.

Regarding the other PPI-SF subscales, it is notable that the Machiavellian Egocentricity and Blame Externalization subscales followed a similar pattern in differentiating across variants, and characterized prominently one of the psychopathic variants. Likewise, the Impulsive Nonconformity scale was able to differentiate both across psychopathic and non-psychopathic variants, and within psychopathic variants. In contrast, the Carefree Nonplanfulness scale mostly differentiated between psychopathic and non-psychopathic variants, but was less useful to identify differences between psychopathic variants. Finally, the Coldheartedness scale was able to differentiate psychopathic and non-psychopathic variants, as well as to prominently define one of the two psychopathic variants, when combined with high Stress Immunity and Social Potency.

Variants of Referred Youth based on Levels of Psychopathic Traits

In this section, we discuss the study findings by describing the five variants of referred youth emerged from the LPA analysis, as well as their associations with external correlates. The largest proportion of youth (approximately 45%) fell into the variant that we labeled *Moderate Psychopathy* (i.e., Cluster 1), as it was characterized by average levels of psychopathic traits across PPI-SF, and served as comparison for the other variants. This subgroup was characterized by high levels of impulsivity and delinquent behavior, and moderate levels of internalizing symptoms. However, they lacked other externalizing features such as substance use. In line with our expectations, our findings revealed a high (i.e., prototypical) psychopathy group, as well as two additional psychopathy variants, although they differed somehow from our hypotheses.

Together, these three variants consisted of approximately 37% of the whole sample, suggesting that more than one-third of referred youth in this population may present with substantial levels of psychopathic traits. Finally, the LPA findings revealed a non-psychopathic variant.

Prototypical Psychopathy Variant. In line with our expectations and with findings from previous studies (e.g., Lee et al., 2010; Ribeiro da Silva et al., 2019), our LPA findings revealed the presence of a subgroup of referred youth showing high scores of psychopathic traits across the board, hence resembling the full-blown manifestation of psychopathy as seen in adults (DeLisi, 2016). This interpretation is also supported by evidence that this group had the highest scores on both PPI-SF and APSD total scores, as well as on two of the three APSD subscales, suggesting that the high levels of psychopathy in this group extend to different methods of operationalization of psychopathy. In line with the robust links between psychopathy and antisociality (DeLisi, 2016; Neumann, Hare, & Pardini, 2015), this group also reported the highest levels of delinquency, and youth in this group were on average the youngest at the time of their first crime. In addition, this group also had the highest levels of substance use, victimization and, to a lesser extent, suicidality and trauma. This finding provides incremental evidence for the potentially important role of early negative environmental experiences in the etiology of psychopathy, although it should be stressed that this speculation is based on retrospective indices of early adverse experiences.

It is worth emphasizing that this group was characterized by high levels of Fearlessness, Stress Immunity (i.e., low anxiety), and Social Potency. On the one hand, this finding suggests that these features do characterize the full-blown manifestation of psychopathy. On the other hand, this finding should be interpreted in combination with evidence that this group was also characterized by high levels of psychological distress, that is, our index of internalizing

symptoms. This pattern of findings provide a counter to the expected protective role of fearlessness, stress immunity, and social potency toward internalizing symptoms, ultimately characterizing the prototypical psychopathy variant as largely maladaptive and pathological.

Psychopathic Variants: The Fearless, Egocentric, and Hostile Profile. The variant that reported the highest levels of victimization, as well as the highest levels of internalizing symptoms, was one of the two psychopathic variants that was defined by specific elevations on the Fearlessness, Machiavellian Egocentricity, and Blame Externalization scales. Thus, this variant was characterized by: (1) the traditional fearlessness associated to psychopathy; (2) a pervasive lack of empathy and a sense of detachment from others for the sake of achieving one's own goal; and (3) a hostile view of others as untrustworthy, accompanied by an unwillingness to take responsibility for one's action. We refer to this as a psychopathic variant given its overall levels on the PPI-SF and APSD total scores, as well as on the APSD Narcissism, Impulsivity, and – to a lesser extent – Callous-Unemotional traits scales. Along with high levels of internalizing problems, this variant also reported high levels of externalizing. Compared to the other psychopathic variant described below, this variant also had relatively higher levels of Impulsive Nonconformity. Taken together, this profile partly resembles psychopathy variants alternatively described in earlier studies as aggressive or secondary variants of psychopathy (e.g., Driessen et al., 2018; Hicks et al., 2004; Kimonis, Skeem, Cauffman, & Dmitrieva, 2011; Mokros et al., 2015; Vaughn et al., 2009). Elevations in fearlessness reported in this variant are not in line with our expectations, but they are consistent with recent meta-analytic findings (Ruchensky et al., 2018) that fearlessness traits may be more closely related to the impulsive, externalizing traits of psychopathy than with its putatively adaptive features of low anxiety and social potency (see also Hoppenbrouwers, Bulten, & Brazil, 2016).

Psychopathic Variants: The Low Anxious, Dominant, and Callous Profile. Another variant was characterized by comparably high levels of the PPI-SF total score, and was thus considered a second psychopathic variant. Although this variant had relatively lower levels on the APSD total score, this variant had levels of APSD Callous-Unemotional traits that were comparable to those of the prototypical psychopathy variant. Indeed, the callousness (as measured by the APSD) and coldheartedness (as measured by the PPI-SF) traits that characterized this variant are well-established core characteristics of psychopathy (Hare & Neumann, 2008; Patrick et al., 2009). In addition, this variant was also characterized by the highest levels of Carefree Nonplanfulness. Importantly, this variant was also characterized by high levels of Stress Immunity (i.e., low anxiety) and Social Potency. Hence, it resembled a variant of psychopathy that emphasizes traits aligned with the construct of boldness (Patrick et al., 2009) and, more broadly, with Cleckley's (1941) early conceptualization of psychopathy. Accordingly, this variant reported the lowest levels of victimization and low levels of internalizing symptoms, in line with a profile of relatively good psychological adjustment, at least as compared to the average youth detained in juvenile institutions (here, the *Moderate Psychopathy* group; see also Gill & Stickle, 2016; Hicks et al., 2004; Kimonis et al., 2011).

In line with their relatively better adjustment, youth in this group showed lower levels of delinquency compared to the two variants described above as well as to the *Moderate Psychopathy* group. However, it is worth noting that levels of self-reported delinquency were nevertheless moderate, and that youth in this group were the youngest at the time of their first police contact and first juvenile court appearance. Thus, it may be argued that, in light of the relatively lower levels of externalizing symptoms and impulsivity, youth in this group engage in less delinquent behavior, but its onset occurs earlier and presumably for more severe crimes (at

least as it can be inferred based on police contacts and court appearances). The latter finding might also help explain the relatively lower levels of delinquent acts, because due to earlier incarceration, these youth likely had fewer opportunities to commit further delinquent acts.

Non-Psychopathic Variant. Finally, our LPA findings revealed that about 17% of the youth in our sample had the lowest levels of psychopathic traits. This variant also had the lowest scores on all of the correlates considered in the present study, including delinquency, substance use, victimization, and internalizing symptoms. Notably, this variant had specific elevations on two of the PPI-SF scales: Stress Immunity and Social Potency. Actually, scores on these scales were comparably high to those of the *Prototypical Psychopathy* variant and the *Low Anxious, Dominant, and Callous* variant. These findings appear to suggest that the positive adjustment features included in some models of psychopathy (e.g., Lilienfeld & Widows, 2005; Patrick et al., 2009) may characterize profoundly different variants of juvenile delinquents based on their co-occurrence (or lack thereof) with other psychopathic traits. When paired with the full range of psychopathic traits, these features may only be minimally protective, and associated with severe externalizing and internalizing symptoms. When paired with the core callous and coldhearted traits of psychopathy (but not with its disinhibition traits), these features may be more protective against internalizing symptoms and substance use, but still associated with delinquent behavior. Finally, when present in isolation, the positive adjustment features captured by the Stress Immunity and Social Potency PPI-SF scales may not only be protective against internalizing symptoms, but also against externalizing symptoms and even against other psychopathic traits.

Implications

The practical relevance of identifying psychopathy variants includes the possibility that these variants may be characterized by different etiologies, and respond differently to

interventions. Although our study design does not allow to address these issues directly, we offer some speculation that may guide longitudinal and clinical studies. As far as etiology is concerned, an important distinction that emerged among psychopathy variants regarded traumatic experiences and victimization. Youth in the prototypical psychopathy variant, as well as those in the psychopathic variant characterized by fearlessness, egocentricity, and hostility, reported the highest levels of trauma and victimization. In contrast, trauma and victimization were not prominent in the psychopathic variant characterized by low anxiety, dominance, and coldheartedness. Bridging these findings with evidence of both genetic and environmental influences in the development of psychopathy (Waldman, Ree, LoParo, & Park, 2018), and allowing for some level of inference, it may be argued that environmental influences play a bigger role in some psychopathy variants (here, prototypical and the fearless, egocentric, and hostile ones) whereas genetic influences play a bigger role in other psychopathy variants (here, the low anxious, dominant, and callous one).

Differences between the prototypical and fearless, egocentric, and hostile variants on the one hand, and the low anxious, dominant, and callous variant on the other hand, may also have relevance for treatment readiness and intervention targets. In particular, levels of internalizing symptoms (being high in the former and low in the latter) likely play a crucial role. Indeed, the experience of subjective distress may help build intrinsic motivation in some youth, whereas for others an initial focus on extrinsic motivation may be preferable (e.g., earlier incarceration and longer sentences for the variant that reported lower internalizing symptoms).

Limitations and Conclusions

The present findings should be interpreted in light of the study limitations. First, we largely relied on self-report instruments to measure the constructs of interest. While this has

made possible to assess a wide range of constructs in a representative population of referred youth, the sole reliance on one assessment method may limit the generalizability of our results. Further, some of the scales used in the present study had low indices of internal consistency. Although these were largely in line with previous studies using the same measures rather than a sample-specific problem, analyses involving those scales should be interpreted with caution, and replications with more reliable measures are warranted. In addition, we did not have access to information about the nature and severity of crimes committed in our sample, as well as about any formal psychiatric diagnosis they might have received. Information of this sort would greatly strengthen the implications of studies in this area. A final consideration is warranted about the replicability and generalizability of these results to other phases in the lifespan. Indeed, these results should be considered with the caveat that the modest temporal stability of psychopathic traits may limit the replicability of the LPA findings. Yet, our use of a greater number of indicators compared to the majority of previous studies may have enhanced the replicability of our findings, because using more indicators has been related to greater replicability in simulation studies (e.g., Wurpts & Geiser, 2014). In addition, it could be that our finding of a greater number of variants than typically found in adulthood has conceptual meaning rather than just reflecting a methodological artefact. Specifically, the rather subtle differences among variants may indicate that as youth grow older, some of them converge into a more limited number of variants. Longitudinal studies may address this possibility by using extensions of LPA such as latent transition analysis.

In conclusion, the present study had the strength of relying on a large, representative sample of referred youth incarcerated in the United States. In particular, this was among the first studies adopting a person-centered approach to identify variants of incarcerated youth based on

levels of psychopathic traits that employed a broad-band operationalization of the construct with the eight PPI-SF subscales. In conclusion, our findings revealed that over one-third of referred youth had substantially high levels of psychopathic traits. By and large, the presence of high levels of psychopathy was associated with a severe history of delinquency. However, our findings also support traditional theories and contemporary perspectives on psychopathy subtypes (Hicks & Drislane, 2018), according to which different constellations of psychopathic traits are likely associated with different degrees of externalizing and internalizing symptoms, substance use, and victimization. We propose that these different profiles might also be related to different etiological precursors, and may respond to different types of treatments. Finally, based on our findings, it appears that individually, none of the trait domains assessed by the PPI-SF subscales can explain differences across variants, and that it is the co-occurrence of all of the features that characterizes the most severe form of psychopathy.

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Table 1

Latent Profile Analysis results: Overview of models up a to 9-class solution with model fit indices (upper half), mean scores and pairwise comparisons for the eight Psychopathic Personality Inventory-Short Form subscales in the 5-class solution (bottom half).

Model	P	LL	AIC	BIC	SSABIC	Class size Min: (%)	Class size Max: (%)	Classification error	Entropy	LMR <i>p</i>	LMR <i>p</i> _{adj}	BLRT <i>p</i>
1-class	16	-4704.673	9441.346	9512.118	9461.321							
2-class	25	-4482.102	9014.205	9124.786	9045.416	45	55	.110	.649	<.001	<.001	<.001
3-class	34	-4412.872	8893.744	9044.134	8936.190	8	51	.112	.754	.012	.013	<.001
4-class	43	-4360.789	8807.577	8997.777	8861.260	8	39	.155	.723	.466	.466	<.001
5-class	52	-4311.774	8727.548	8957.557	8792.467	8	45	.179	.726	.014	.015	<.001
6-class	61	-4282.131	8686.262	8956.080	8762.416	6	38	.198	.719	.296	.303	<.001
7-class	70	-4258.034	8656.068	8965.696	8743.459	5	35	.222	.711	.800	.803	<.01
8-class	79	-4238.838	8635.676	8985.112	8734.302	4	29	.229	.709	.244	.245	<.001
9-class	88	-4222.801	8621.602	9010.847	8731.464	3	25	.223	.729	.429	.432	<.01
					Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5			
<i>Cluster Size</i>					.4493	.2055	.1718	.0963	.077			
Fearlessness					2.3695 ^a	2.7791 ^b	2.4045 ^a	1.8527 ^c	3.1165 ^d			
Stress Immunity					2.6805 ^a	2.0667 ^b	3.3542 ^c	3.1458 ^c	3.2081 ^c			
Social Potency					2.9195 ^a	2.4549 ^b	3.3997 ^c	3.1296 ^d	3.3135 ^{cd}			
Machiavellian Egocentricity					2.4717 ^a	2.9840 ^b	1.8333 ^c	2.1222 ^d	2.7754 ^b			
Impulsive Nonconformity					2.0026 ^a	2.4422 ^b	1.7995 ^c	1.6784 ^c	2.9958 ^d			
Blame Externalization					2.5716 ^a	3.1084 ^b	2.2071 ^c	2.0010 ^c	2.7740 ^a			
Carefree Nonplanfulness					1.9429 ^a	2.2438 ^b	1.4755 ^c	2.4046 ^b	2.3370 ^b			
Coldheartedness					2.1446 ^a	1.7306 ^b	2.1377 ^a	3.1691 ^c	2.7546 ^d			

Note. P = number of free parameters; LL = log-likelihood; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SSABIC = Sample Size Adjusted BIC; LMR *p* = *p*-value of the Lo-Mendell-Rubin ratio test for *k* versus *k*-1 class solution; LMR *p*_{adj} = *p*-value of the LMR adjusted ratio test for *k* versus *k*-1 class solution (for both LMR *p* and LMR *p*_{adj}, a significant *p*-value rejects *k*-1 model in favor of *k* class model). BLRT = Bootstrapped Likelihood Ratio Test. The 5-class solution (bold typeface) was retained for further analyses. In the bottom half table, different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons (*p* < .05).

Table 2

Age and psychopathy scores, as well as crime- and substance use-related correlates across clusters for the 5-class solution.

<i>Cluster Label</i>	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Moderate Psychopathy <i>M(SE)</i>	Fearless, Egocentric, and Hostile <i>M(SE)</i>	Low Anxious and Dominant <i>M(SE)</i>	Low Anxious, Dominant, and Callous <i>M(SE)</i>	Psychopathic (prototypical) <i>M(SE)</i>
Age	15.48(.09) ^a	15.33(.13) ^{ac}	16.01(.16) ^b	14.91(.22) ^c	15.75(.17) ^{ab}
PPI total score	2.36(.02) ^a	2.50(.02) ^b	2.30(.02) ^a	2.46(.03) ^b	3.00(.04) ^c
APSD Narcissism	.87(.03) ^a	1.09(.04) ^b	.37(.04) ^c	.54(.05) ^d	.93(.07) ^a
APSD CU traits	.69(.02) ^a	.85(.04) ^b	.39(.03) ^c	1.09(.06) ^d	1.09(.07) ^d
APSD Impulsivity	1.15(.03) ^a	1.48(.03) ^b	.64(.04) ^c	.92(.06) ^d	1.44(.05) ^b
APSD total score	.91(.02) ^a	1.13(.03) ^b	.49(.02) ^c	.84(.04) ^a	1.16(.04) ^b
SRD total	1.73(.08) ^a	1.92(.14) ^a	.92(.11) ^b	1.37(.16) ^c	2.42(.20) ^d
SRD violent	1.24(.07) ^{ac}	1.39(.14) ^a	.62(.09) ^{bc}	.94(.15) ^c	1.41(.18) ^a
SRD non-violent	2.29(.12) ^{ac}	2.50(.19) ^a	1.25(.16) ^b	1.85(.22) ^c	3.56(.29) ^d
Age onset of crime	10.56(.19) ^{ab}	10.12(.29) ^a	11.09(.35) ^b	10.03(.45) ^{abc}	9.01(.43) ^c
Age onset police contact	10.85(.18) ^{ab}	10.85(.26) ^{ab}	11.62(.33) ^a	10.28(.41) ^b	10.48(.44) ^b
Age onset juvenile court	12.46(.15) ^{ab}	12.61(.23) ^a	13.07(.24) ^b	11.91(.32) ^a	12.37(.36) ^{ab}
Lifetime substance use	13.74(.68) ^a	16.97(1.22) ^b	12.88(1.03) ^a	13.31(1.47) ^{ab}	29.64(1.90) ^c
Past year substance use	23.76(1.30) ^a	30.48(2.33) ^b	23.72(1.93) ^a	22.14(2.73) ^a	49.67(3.44) ^c

Note. PPI = Psychopathic Personality Inventory Short Form. APSD = Antisocial Process Screening Device. CU = Callous Unemotional. SRD = Self Report Delinquency. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

Table 3

Victimization, suicidality (ideation and attempts), traumatic experiences, and psychological distress (BSI scale and total scores) across clusters for the 5-class solution.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
<i>Cluster Label</i>	Moderate Psychopathy <i>M(SE)</i>	Fearless, Egocentric, and Hostile <i>M(SE)</i>	Low Anxious and Dominant <i>M(SE)</i>	Low Anxious, Dominant, and Callous <i>M(SE)</i>	Psychopathic (prototypical) <i>M(SE)</i>
Victimization	1.64(.10) ^a	1.94(.19) ^{ac}	1.18(.15) ^b	.82(.15) ^b	2.37(.28) ^c
Suicidality (count)	1.69(.15) ^a	4.02(.24) ^b	.87(.21) ^c	.65(.27) ^c	2.93(.42) ^d
Traumatic Experiences	3.06(.11) ^a	3.57(.15) ^b	2.50(.19) ^c	1.53(.24) ^d	3.15(.27) ^{ab}
<i>BSI</i>					
Somatization	.45(.04) ^a	.98(.08) ^b	.16(.04) ^c	.11(.05) ^c	.59(.12) ^a
Obsessive-Compulsive	1.02(.06) ^a	1.83(.10) ^b	.32(.06) ^c	.48(.10) ^c	1.56(.16) ^b
Interpersonal Sensitivity	.64(.05) ^a	1.56(.11) ^b	.13(.04) ^c	.14(.06) ^c	.53(.11) ^a
Depression	.63(.05) ^a	1.48(.10) ^b	.30(.07) ^c	.17(.07) ^c	1.06(.18) ^d
Anxiety	.60(.05) ^a	1.43(.10) ^b	.20(.05) ^c	.16(.06) ^c	.98(.13) ^d
Hostility	1.18(.06) ^a	1.96(.12) ^b	.51(.08) ^c	.60(.12) ^c	1.62(.18) ^b
Phobic Anxiety	.30(.04) ^a	.88(.09) ^b	.07(.04) ^c	.06(.05) ^c	.51(.11) ^a
Paranoid Ideation	1.30(.06) ^a	2.02(.11) ^b	.54(.08) ^c	.38(.09) ^c	1.46(.13) ^a
Psychoticism	.61(.05) ^a	1.38(.10) ^b	.23(.05) ^c	.25(.09) ^c	1.03(.16) ^b
BSI Global Severity Index	.75(.04) ^a	1.48(.08) ^b	.28(.04) ^c	.26(.05) ^c	1.04(.12) ^d

Note. BSI = Brief Symptom Inventory. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

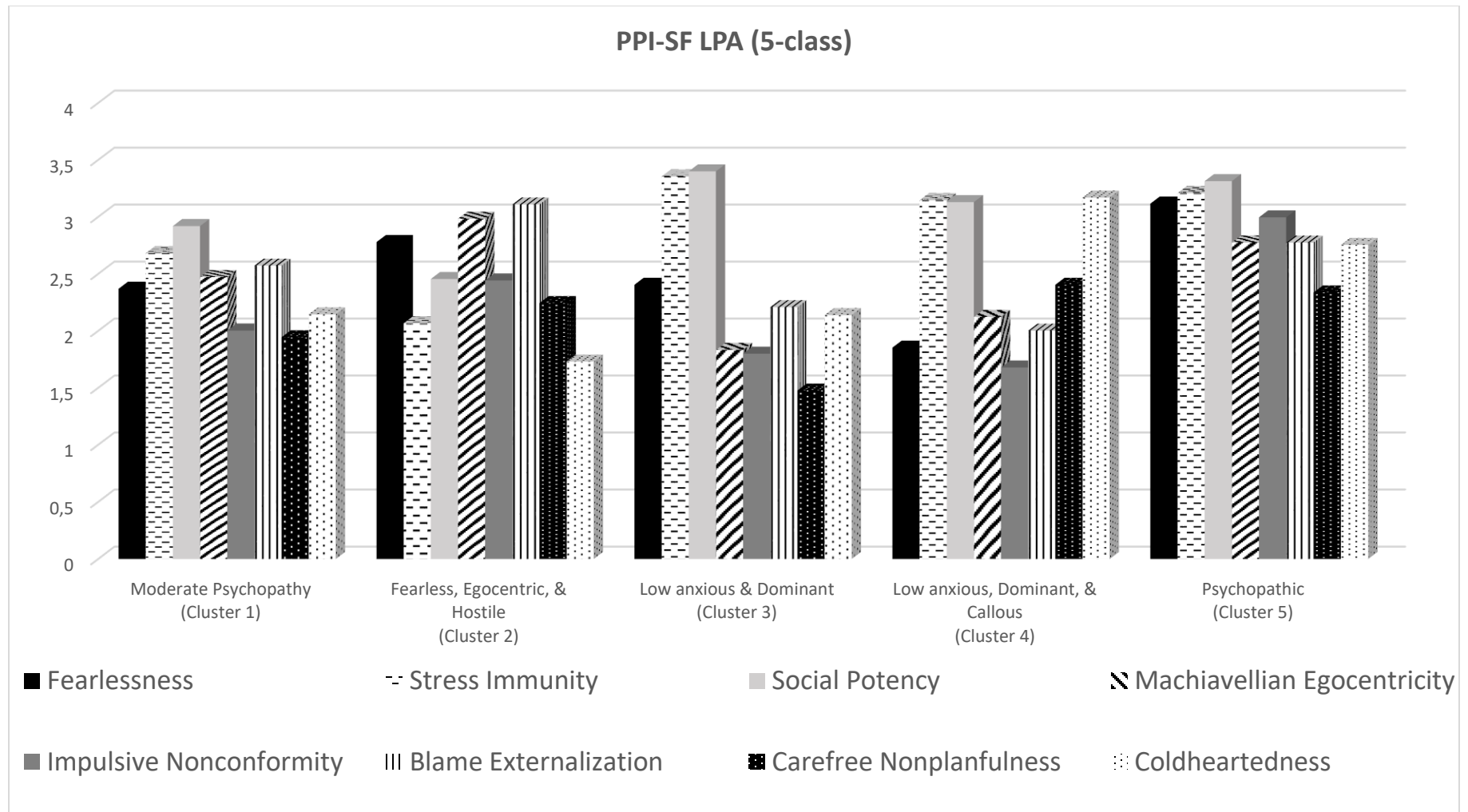


Figure 1. Graphical depiction of the 5-class solution with cluster labels.

Supplementary Materials for *A Latent Profile Analysis of the Psychopathic Personality Inventory in a Representative Sample of Referred Boys*

Table S1

Mean and standard deviation (SD) for all study variables in the whole sample (N = 616).

<i>Scale</i>	<i>Variable</i>	<i>N (valid)</i>	<i>M</i>	<i>SD</i>
PPI	Fearlessness	616	2.47	.74
	Stress Immunity	616	2.76	.61
	Social Potency	616	2.96	.57
	Machiavellian Egocentricity	616	2.46	.64
	Impulsive Nonconformity	616	2.10	.59
	Blame Externalization	616	2.58	.69
	Carefree Nonplanfullness	616	2.00	.55
	Coldheartedness	616	2.20	.67
	Total score	616	2.44	.25
APSD	Narcissism	616	.80	.40
	Callous-Unemotional	616	.74	.37
	Impulsive	616	1.13	.41
	Total score	616	.90	.29
SRD	Non-violent delinquency	616	2.21	1.67
	Violent delinquency	616	1.15	1.06
	Total delinquency	616	1.65	1.19
	Victimization index	616	1.60	1.49
Criminal history	Age of first crime	616	1.39	2.77
	Age of first police contact	616	1.90	2.61
	Age of first court appearance	616	12.53	2.11

MAYSI-2	Suicidality index	615	.34	.38
	Traumatic experiences	615	.59	.60
BSI	Somatization	616	.49	.59
	Obsessive-Compulsive	616	1.06	.87
	Interpersonal Sensitivity	616	.68	.81
	Depression	616	.74	.82
	Anxiety	616	.69	.75
	Hostility	616	1.20	.99
	Phobic Anxiety	616	.37	.62
	Paranoid Ideation	616	1.24	.94
	Psychoticism	616	.70	.76
	Global Severity Index	616	.80	.64

Note. PPI-SF = Psychopathic Personality Inventory-Short Form. APSD = Antisocial Process Screening Device. SRD = Self-Report Delinquency. MAYSI-2 = Massachusetts Youth Screening Inventory-2. BSI = Brief Symptom Inventory.

Table S2

Mean scores and pairwise comparisons for the eight subscales of the Psychopathic Personality Inventory-Short Form in the 6-class solution.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
<i>Cluster Size (%)</i>	.3781	.2191	.1346	.1249	.0794	.0639
Fearlessness	2.2622 ^a	2.7989 ^b	2.2859 ^{ac}	2.6374 ^{bc}	3.0899 ^d	1.8218 ^e
Stress Immunity	2.6414 ^a	2.1006 ^b	3.3294 ^c	3.1197 ^c	3.1842 ^c	3.2251 ^c
Social Potency	2.8639 ^a	2.4851 ^b	3.3523 ^c	3.2885 ^c	3.3004 ^c	3.2211 ^c
Machiavellian Egocentricity	2.4583 ^a	2.9684 ^b	1.8068 ^c	2.2386 ^{ad}	2.7786 ^b	2.0919 ^{cd}
Impulsive Nonconformity	1.924 ^a	2.444 ^b	1.7202 ^c	2.1128 ^a	2.9759 ^d	1.6995 ^c
Blame Externalization	2.4567 ^a	3.1167 ^b	1.8704 ^c	2.9756 ^{bd}	2.7624 ^d	1.9627 ^c
Carefree Nonplanfulness	2.0395 ^a	2.2197 ^b	1.5441 ^c	1.4873 ^c	2.366 ^{bd}	2.5071 ^d
Coldheartedness	2.2793 ^a	1.7132 ^b	2.2955 ^a	1.8092 ^b	2.7523 ^c	3.3385 ^d

Note. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

Table S3

Age and psychopathy scores across clusters for the 6-class solution.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
<i>Cluster Label</i>	Moderate Psychopathy <i>M(SE)</i>	Fearless, Egocentric, and Hostile <i>M(SE)</i>	Low Anxious and Dominant <i>M(SE)</i>	Low Anxious, Dominant, and Hostile <i>M(SE)</i>	Psychopathic (prototypical) <i>M(SE)</i>	Low Anxious, Dominant, and Callous <i>M(SE)</i>
Age	15.33(.10) ^{ac}	15.36(.12) ^{ac}	15.84(.19) ^b	16.14(.19) ^b	15.72(.17) ^{ab}	14.85(.26) ^c
PPI total score	2.32(.02) ^a	2.50(.02) ^b	2.20(.03) ^c	2.52(.03) ^b	3.01(.04) ^d	2.54(.04) ^b
APSD Narcissism	.89(.03) ^a	1.07(.04) ^b	.33(.04) ^c	.66(.05) ^d	.92(.07) ^{ab}	.50(.07) ^e
APSD CU traits	.78(.03) ^a	.82(.04) ^a	.44(.04) ^b	.35(.05) ^b	1.10(.06) ^c	1.14(.07) ^c
APSD Impulsivity	1.20(.03) ^a	1.46(.03) ^b	.64(.05) ^c	.79(.05) ^d	1.45(.05) ^b	.88(.07) ^d
APSD total score	.96(.02) ^a	1.11(.03) ^b	.48(.03) ^c	.65(.04) ^d	1.17(.04) ^b	.82(.04) ^e

Note. PPI = Psychopathic Personality Inventory Short Form. APSD = Antisocial Process Screening Device. CU = Callous

Unemotional. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

Table S4

Crime- and substance use-related correlates for the 6-class solution.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
<i>Cluster Label</i>	Moderate Psychopathy <i>M(SE)</i>	Fearless, Egocentric, and Hostile <i>M(SE)</i>	Low Anxious and Dominant <i>M(SE)</i>	Low Anxious, Dominant, and Hostile <i>M(SE)</i>	Psychopathic (prototypical) <i>M(SE)</i>	Low Anxious, Dominant, and Callous <i>M(SE)</i>
SRD total	1.74(.09) ^{ad}	2.00(.14) ^{ac}	.75(.12) ^b	1.69(.18) ^{ad}	2.45(.19) ^c	1.45(.20) ^d
SRD violent	1.22(.09) ^{ac}	1.46(.13) ^a	.49(.10) ^b	1.19(.16) ^{ac}	1.43(.18) ^{ac}	1.01(.19) ^c
SRD non-violent	2.31(.13) ^a	2.60(.18) ^a	1.05(.19) ^b	2.25(.23) ^a	3.59(.29) ^c	1.95(.28) ^a
Age onset of crime	10.46(.22) ^a	10.12(.28) ^a	11.53(.43) ^b	10.17(.45) ^{ac}	9.07(.42) ^c	9.84(.55) ^{ac}
Age onset police contact	10.75(.21) ^a	10.83(.26) ^{ab}	11.74(.43) ^b	11.12(.38) ^{ab}	10.46(.43) ^a	10.21(.48) ^a
Age onset juvenile court	12.30(.17) ^a	12.64(.22) ^{ab}	13.18(.28) ^b	12.71(.33) ^{ab}	12.34(.36) ^{ab}	11.79(.42) ^a
Lifetime substance use	14.33(.72) ^a	17.72(1.13) ^b	13.43(1.10) ^a	15.25(1.32) ^{ab}	29.24(1.87) ^c	13.56(1.88) ^{ab}
Past year substance use	23.53(1.39) ^a	29.99(2.18) ^b	22.37(2.15) ^a	25.91(2.57) ^{ab}	49.06(2.48) ^c	22.11(3.46) ^{ab}

Note. SRD = Self-Report Delinquency. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

Table S5

Victimization, trauma, and suicidality (ideation and attempts) across clusters for the 6-class solution.

<i>Cluster Label</i>	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
	Moderate Psychopathy	Fearless, Egocentric, and Hostile	Low Anxious and Dominant	Low Anxious, Dominant, and Hostile	Psychopathic (prototypical)	Low Anxious, Dominant, and Callous
	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>
Victimization	1.47(.11) ^a	1.96(.18) ^b	.82(.14) ^c	1.99(.22) ^b	2.38(.28) ^b	.92(.19) ^c
Suicidality (count)	1.58(.17) ^a	3.91(.23) ^b	.58(.23) ^c	1.77(.33) ^a	2.90(.41) ^d	.59(.32) ^c
Trauma	2.83(.13) ^a	3.63(.14) ^b	1.94(.21) ^c	3.67(.24) ^b	3.15(.26) ^{ab}	1.52(.29) ^c

Note. SRD = Self-Report Delinquency. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

Table S6

Psychological distress (BSI scale and total scores) across clusters for the 6-class solution.

<i>Cluster Label</i>	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
	Moderate Psychopathy	Fearless, Egocentric, and Hostile	Low Anxious and Dominant	Low Anxious, Dominant, and Hostile	Psychopathic (prototypical)	Low Anxious, Dominant, and Callous
	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>	<i>M(SE)</i>
Somatization	.41(.04) ^a	.97(.07) ^b	.07(.05) ^c	.46(.06) ^a	.60(.12) ^a	.12(.06) ^c
Obsessive-Compulsive	.96(.06) ^a	1.81(.10) ^b	.20(.04) ^c	.94(.11) ^a	1.56(.16) ^b	.47(.11) ^d
Interpersonal Sensitivity	.61(.05) ^a	1.52(.10) ^b	.08(.02) ^c	.52(.09) ^a	.54(.11) ^a	.12(.08) ^c
Depression	.57(.05) ^a	1.45(.10) ^b	.17(.06) ^c	.68(.11) ^a	1.06(.18) ^b	.14(.07) ^c
Anxiety	.53(.05) ^a	1.42(.09) ^b	.11(.06) ^c	.60(.09) ^a	.98(.13) ^d	.16(.07) ^c
Hostility	1.17(.07) ^a	1.94(.11) ^b	.44(.10) ^c	.91(.12) ^a	1.65(.18) ^b	.50(.13) ^c
Phobic Anxiety	.28(.04) ^a	.86(.08) ^b	.02(.02) ^c	.31(.08) ^a	.51(.11) ^a	.03(.05) ^c
Paranoid Ideation	1.18(.07) ^a	2.03(.10) ^b	.31(.09) ^c	1.37(.13) ^a	1.46(.13) ^a	.36(.11) ^c
Psychoticism	.52(.05) ^a	1.37(.09) ^b	.09(.04) ^c	.75(.10) ^a	1.03(.16) ^d	.30(.11) ^c
BSI Global Severity Index	.68(.04) ^a	1.47(.07) ^b	.18(.02) ^c	.74(.07) ^a	1.05(.12) ^d	.25(.06) ^c

Note. BSI = Brief Symptom Inventory. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

Table S7

Mean scores and pairwise comparisons for the eight subscales of the Psychopathic Personality Inventory-Short Form in the 4-class solution.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
<i>Cluster Size</i>	<i>.3909</i>	<i>.3717</i>	<i>.1577</i>	<i>.0797</i>
Fearlessness	2.6213 ^a	2.3911 ^b	1.9437 ^c	3.1061 ^d
Stress Immunity	2.2592 ^a	3.0918 ^b	2.9832 ^b	3.1711 ^b
Social Potency	2.5800 ^a	3.2356 ^b	3.0562 ^c	3.3114 ^b
Machiavellian Egocentricity	2.7885 ^a	2.1315 ^b	2.2464 ^b	2.7674 ^a
Impulsive Nonconformity	2.3019 ^a	1.8715 ^b	1.7129 ^c	2.9838 ^d
Blame Externalization	2.9117 ^a	2.3724 ^b	2.1468 ^c	2.7787 ^a
Carefree Nonplanfullness	2.1513 ^a	1.6269 ^b	2.3171 ^a	2.3616 ^a
Coldheartedness	1.8716 ^a	2.1118 ^b	2.9641 ^c	2.7604 ^c

Note. Different superscripts indicate a significant difference between clusters according to Wald test for paired comparisons ($p < .05$).

Table S8

Summary of findings.

Label	PPI-SF Profile	Psychopathy levels	Delinquency	Substance use	Victimization, Suicidality, Trauma	Internalizing	General description	Comparability with previous studies
<i>Moderate Psychopathy</i> (Cluster 1)	Moderately high levels on all scales	Low, except APSD Impulsivity	High	Low	Moderate	Moderate	General antisocial, non-psychopathic, group; high externalizing and moderate internalizing, low substance use	Non-psychopathic, general offender group ^a
<i>Fearless, Egocentric, and Hostile</i> (Cluster 2)	High Fearlessness, Machiavellian Egocentricity, and Blame Externalization; Low Stress Immunity, Social Potency, and Coldheartedness	High, especially APSD Narcissism and Impulsivity	High	High	Highest (especially suicidality and trauma)	Highest	Psychopathy variant characterized by fearlessness, hostility, and overt behavioral dysregulation; highest internalizing and relatively high externalizing	Primary psychopathy variant characterized by overt aggression and both externalizing and internalizing ^b
<i>Low Anxious and Dominant</i> (Cluster 3)	High Stress Immunity and Social Potency	Lowest	Low	Low	Low	Low	Non-psychopathic group, relatively well-adjusted (emotional stability and interpersonal dominance); low externalizing and internalizing	Non-psychopathic, well-adjusted group ^c
<i>Low Anxious, Dominant, and Callous</i> (Cluster 4)	High Stress Immunity, Social Potency, and Coldheartedness	High, especially APSD CU traits	Moderate; youngest at first police contact and juvenile court appearance	Low	Lowest	Low	Psychopathy variant characterized by emotional stability and callousness; early criminal justice contact; moderately high externalizing but low substance use and internalizing	Primary psychopathy variant characterized by emotional stability and covert dissocial tendencies ^d
<i>Psychopathic</i> (Cluster 5)	High levels on all subscales	Highest	Highest level; youngest at first crime	Highest	Highest (especially victimization)	High	Prototypical psychopathic youth according to the PPI-SF operationalization; highest externalizing and relatively high internalizing; early criminal justice contact	Prototypical psychopathy ^e

Note. PPI-SF = Psychopathic Personality Inventory Short Form. APSD = Antisocial Process Screening Device. CU = Callous Unemotional

^a Colins et al., 2016, 2017; Driessen et al., 2018; Hare et al., 2018; Lee et al., 2010; Ribeiro da Silva et al., 2019; Wareham et al., 2009

^b Colins et al., 2016; Driessen et al., 2018; Hicks et al., 2006; Kimonis et al., 2011, 2012; Mokros et al., 2015; Tatar et al., 2012; Vaughn et al., 2009; Wareham et al., 2009

^c Colins et al., 2016, 2017; Lee et al., 2010; Ribeiro da Silva et al., 2019; Wareham et al., 2009

^d Colins et al., 2016; Driessen et al., 2018; Gill & Stickle, 2016; Hicks et al., 2006; Kimonis et al., 2011, 2012; Mokros et al., 2015; Tatar et al., 2012; Vaughn et al., 2009; Wareham et al., 2009

^e Colins et al., 2016, 2017; Driessen et al., 2018; Hare et al., 2018; Ribeiro da Silva et al., 2019; Lee et al., 2010

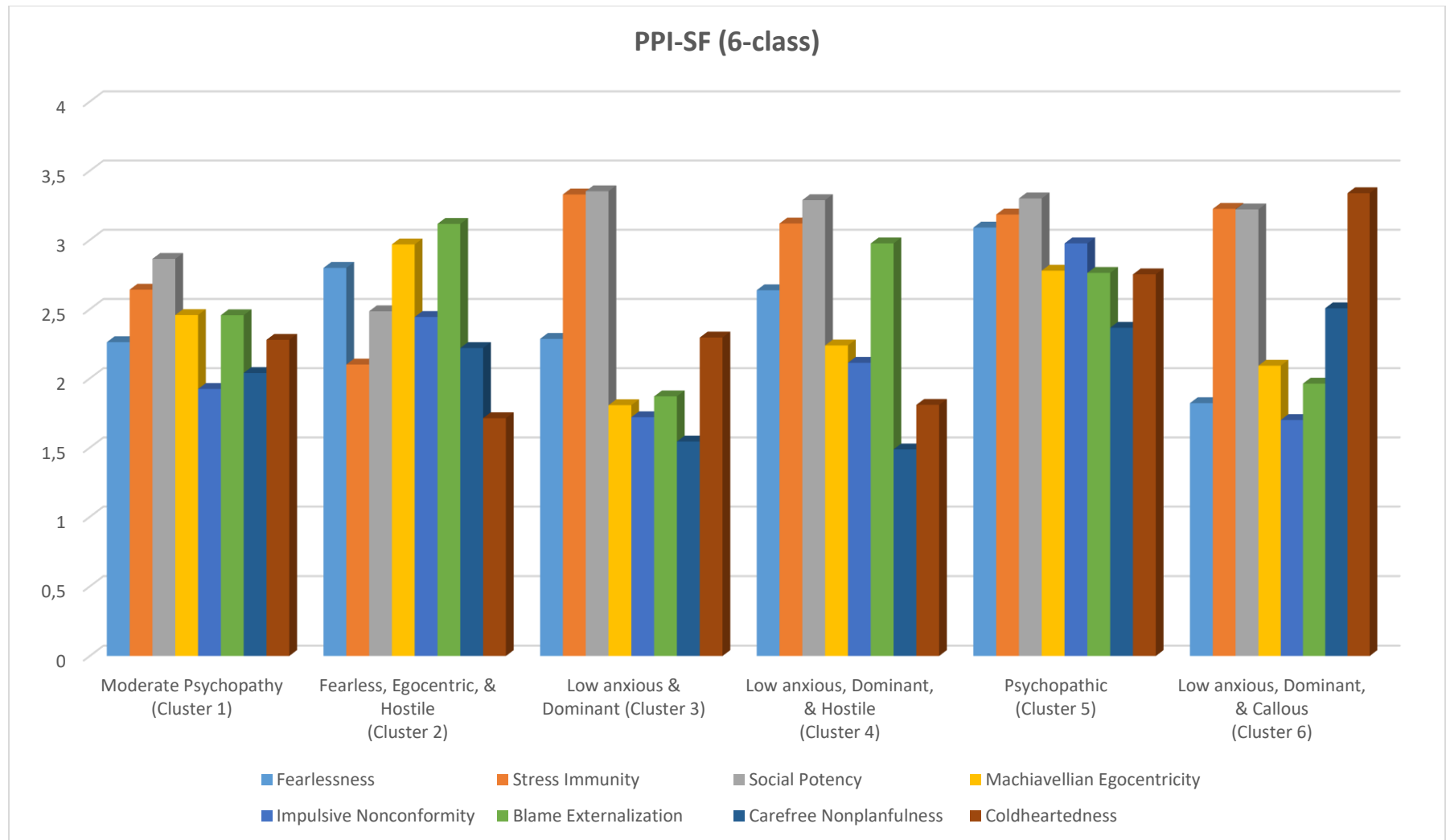


Figure S1. Graphical depiction of the 6-class solution with cluster labels.

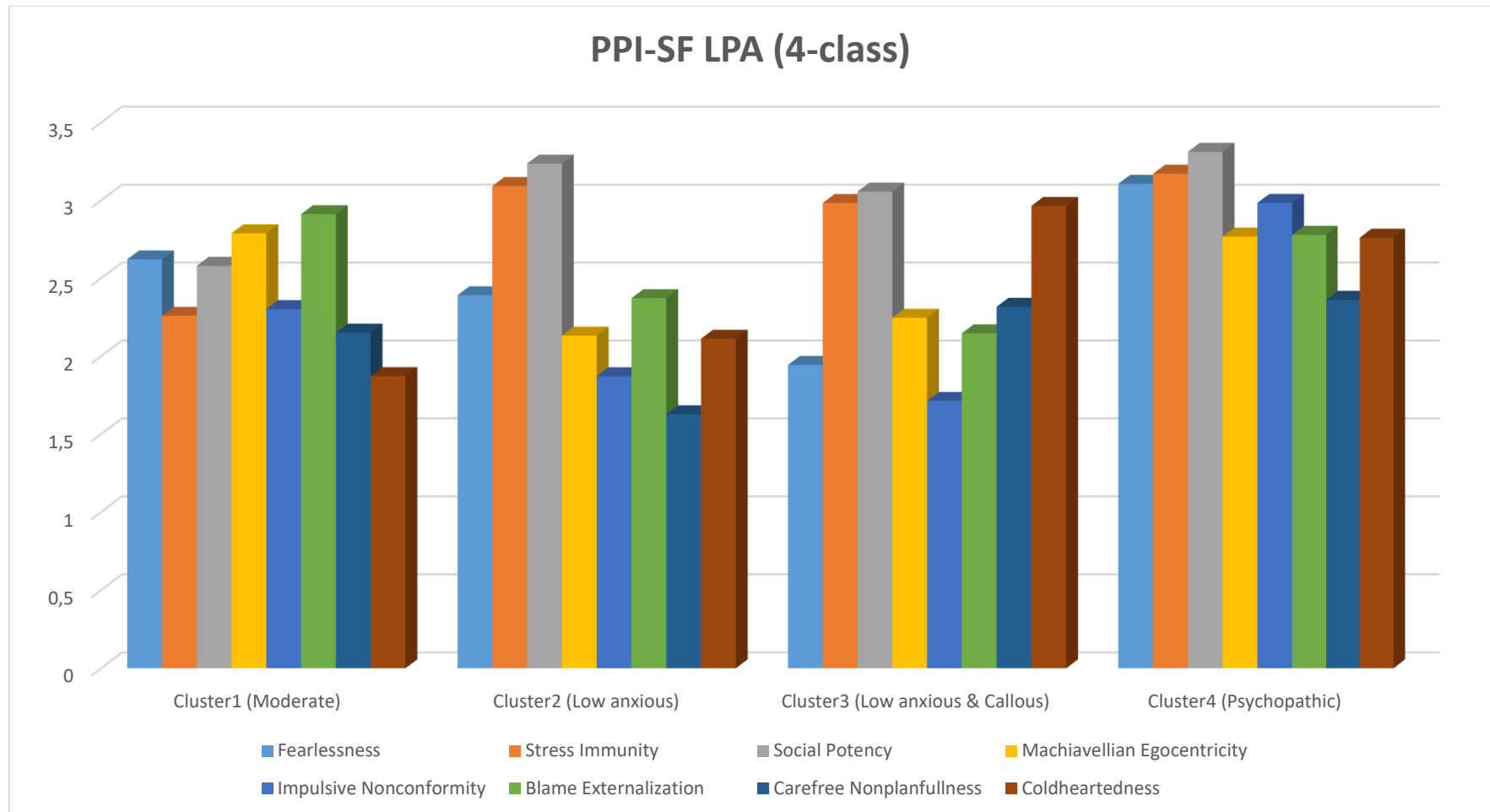


Figure S2. Graphical depiction of the 4-class solution with cluster labels.